

1. Joint Cost Accounting Conventions Greatly Limit the Scope for Opportunistic Joint Cost Manipulation

The critical determinant of the scope for joint cost manipulation is the accounting conventions adopted to assign joint costs. Historically, these conventions have varied dramatically, enabling serious abuses in some instances and, in others, having no material distortions. One of the most serious abuses arose in the joint cost allocation between basic local telephone service and long distance. Even though the local and long distance networks were physically separate with only a switching office being a joint cost connecting the two, regulators were not content to simply assign the switching costs. Rather, long distance customers were forced to pay a portion of the cost of the local service network under the logic that in the absence of a local service network, there would be no demand for long distance. By this logic, software manufacturers should be forced to pay for computers, since in the absence of computers, there would be no demand for software! Regulators completely confused the concepts of complementarity in demand with complementarity in supply. Fortunately, advances in regulatory accounting conventions now clearly focus on procedures to allocate costs when production is joint. In the case of basic service and enhanced services, accounting procedures require that activities devoted entirely to a given activity be allocated only to that activity. For example, employees, office spaces, and equipment used strictly for enhanced services must be allocated accordingly. Costs of employees engaged in performing both basic and enhanced services, such as in joint marketing operations, are allocated based on time spent or activity levels for basic service functions vis-a-vis enhanced services. The important point is that with accounting conventions requiring cost allocations based on the fraction of time spent or activity levels in alternative activities, regulators have a powerful tool to avoid and detect cost manipulation. Individual cost allocations are subject to audit. Furthermore, to the extent that one BOC systematically allocates a higher fraction of time costs to certain joint cost activities, it will become an outlier in cost comparisons with other BOCs. The BOCs have responded to the FCC's requirements (FCC Docket 86-111) for cost apportionment with highly-structured and detailed accounting processes.

In the case of U S WEST, separating costs between regulated and nonregulated activities (basic service and enhanced services) involves cost apportionment and accounting principles that

group costs into four apportionment categories.³⁰ These categories are: *Directly Assignable Costs*, *Directly Attributable Costs*, *Indirectly Attributable Costs*, and *Unattributable Costs*. The process for grouping costs begins by listing and identifying as regulated or nonregulated all services presently offered to customers or expected to be offered in the future. Each account is analyzed to determine whether its contents are dedicated solely to a regulated or nonregulated activity or are shared among regulated and nonregulated activities. Often, the accounts are sufficiently homogeneous so that the same cost factors can be used and no additional disaggregation required.

Directly Assignable Costs are those costs incurred exclusively for providing either regulated services or nonregulated activities. For example, the salary of a customer service representative dealing exclusively with interexchange carriers for the provision of access services is a cost assignable directly to regulated (basic) services. Many costs are incurred for the provision of both regulated and nonregulated activities. The grouping and apportionment of these costs is contingent upon whether there are direct or indirect measures of cost causation. For example, in the area of customer accounting service and equipment processing expense, costs are directly attributed to regulated services and nonregulated activities based on the number of regulated and nonregulated universal service order codes (USOCs) in service orders. Services and activities with such direct cost measures are classified as *Directly attributable*. *Indirectly Attributable costs*, however, are those in which there is an indirect measure of cost causation, such as the distribution of time spent on regulated services and nonregulated activities. An example from this group is the salary of a supervisor of craft employees supporting both regulated services and nonregulated activities. The supervisor's salary is apportioned based on the craft employees' time worked in each area.

More than 90% of U S WEST's costs are identified to be either directly assigned or directly or indirectly attributed. The remaining costs fall into the *Unattributable Costs* group. These costs are shared between regulated services and nonregulated activities but do not have a causal relationship. The salary of the chief executive officer is included as an unattributable cost. These costs are accumulated and allocated to *both* regulated services and nonregulated activities through the use of a general allocator. This allocator uses as its denominator the total of all expenses directly

³⁰Section VI, *Regulatory Impact Review of U S WEST Advanced Technologies, Inc.*, Schumaker & Company, 1992.

assigned or attributed to regulated and nonregulated categories. Because of this rigorous framework for assigning costs, it would appear to constrain the BOCs from allocating no more than 5% to 10% of the costs of enhanced services into the basic service rate base.

U S WEST's cost allocations are audited on a regular basis by both internal and external auditors. Implementation and enforcement of the FCC rules also require that U S WEST and other BOCs file and maintain current cost allocation manuals demonstrating in detail the application of these rules to their particular operations. U S WEST complies with this requirement by filing and maintaining the U S WEST Cost Allocation Manual (CAM).

2. Estimation of Welfare Effects

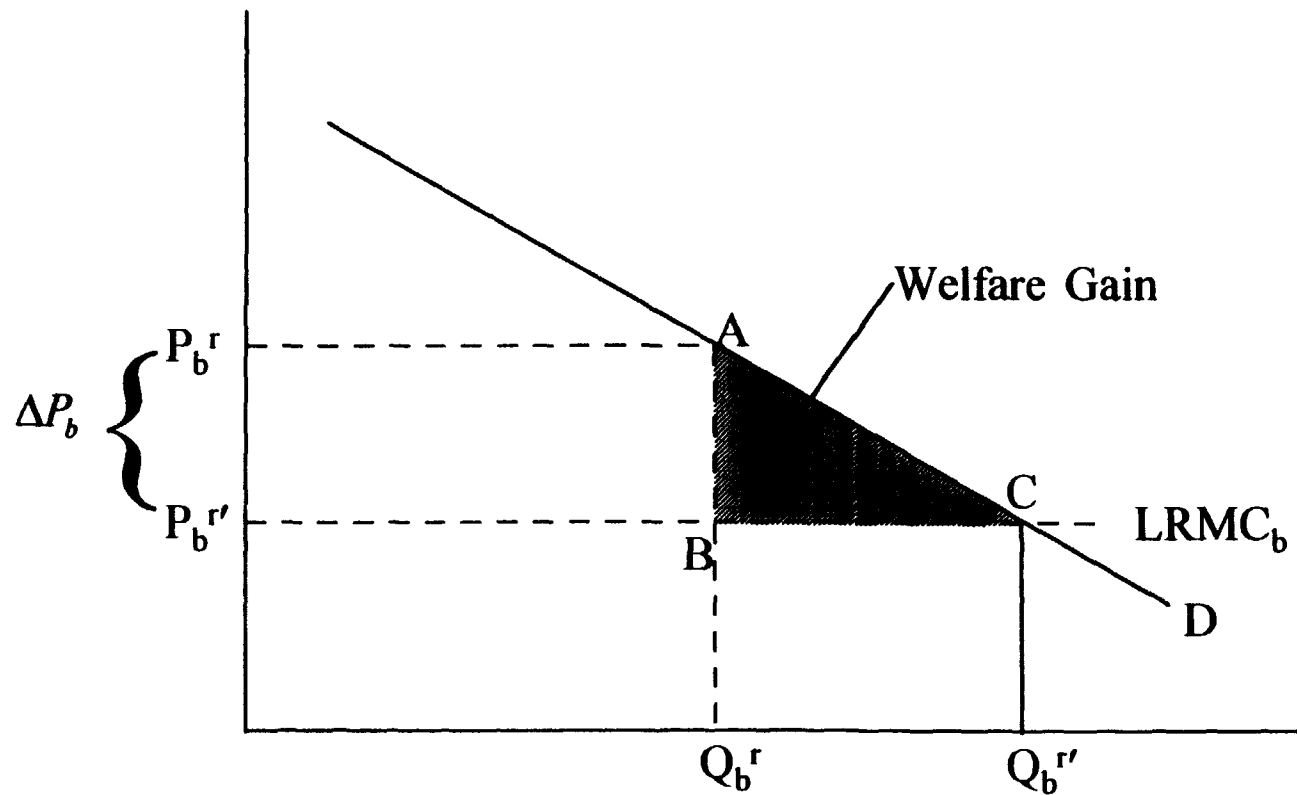
To place into perspective the issue of welfare effects from the overstatement of basic service costs perspective, this section provides some sensitivity analyses to illustrate that the welfare gains from avoiding over-pricing basic service are trivial, yet the welfare losses from sacrificing cost complementarities are potentially huge. Using the familiar Harberger welfare formula, the welfare gain from eliminating inflated basic service prices is given by Figure B.1. Note that prior to structural separation the price of basic service is assumed to be P_b^r , which is assumed to exceed the long run marginal costs of basic service ($LRMC_b$). Now after structural separation, we assume for simplicity that the true long run marginal cost of basic service ($LRMC_b$) is unaffected, but the BOC can no longer allocate costs attributable to enhanced services to basic service, so that the basic service rates fall to P_b^r . This presumes that there are no cost complementarities which would be lost as a consequence of structural separation. The resulting welfare gain (WG) is the triangle ABC, which can be mathematically described as follows:

$$WG = \frac{1}{2} \left(\frac{\Delta P_b}{P_b^r} \right)^2 e_d B \quad (B4)$$

where $\frac{\Delta P_b}{P_b^r}$ is the fractional decrease in the price, B is the customer's original local service bill and e_d is the price elasticity of market demand for basic service. In 1994, the average price of basic

Figure B.1

Welfare Gain from Preventing Inflated Basic Service Rates



telephone service (B) in the U S WEST region was \$23.90/month.³¹ Next, in 1994, total costs of enhanced services were only 2.1% of basic service costs.³² Assuming that 5% of the costs of enhanced services were shifted to the basic service rate base, the fractional decrease in the price of basic service would be .1%. Finally, one must estimate the price elasticity of basic service market demand. It is widely agreed that the price elasticity is extremely inelastic. The most common estimate for e_d in the literature is .1.³³ Substituting these values into equation (B4), we find that the monthly welfare gain is about one-ten thousandth of a cent per access line. The estimated welfare gain is $\$1.3 * 10^{-6}$ /month for each access line. Aggregated across all 13.6 million access lines in the US WEST region and converted to an annual total, the welfare gain from avoiding inflated basic service rates is still only \$215 annually!

Furthermore, this estimate is predicated upon the absence of any cost complementarities between basic service and enhanced services. Yet, there are good reasons to believe that there are significant cost complementarities. Figure B.2 introduces cost complementarities. Note that after structural separation, the cost of basic service is assumed to shift up to $LRMC_b$. Note that the price reduction in basic service is smaller than in Figure B.1 due to the increase in the marginal costs of providing basic service. The net welfare effect is the triangular welfare gain from eliminating inflated basic service prices as in Figure B.1 minus the welfare loss due to the higher costs of providing basic service.³⁴

$$WG = \text{Area } ABC - \text{Area } P_b^r BJK \quad (B5)$$

Mathematically, the two areas depend on the following:

³¹Based on 1994 basic service revenue of \$3.9 billion and 13.6 million access lines.

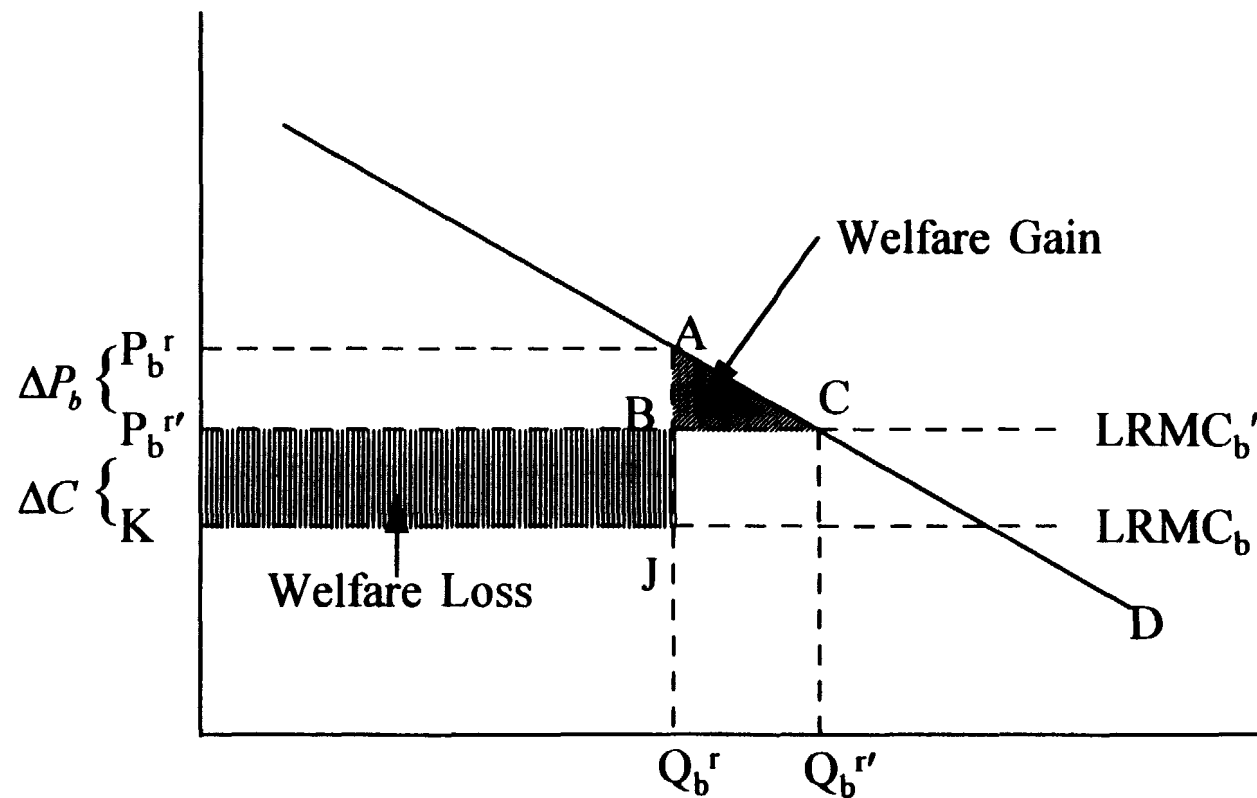
³²Absent cost data, we took 1994 revenues of \$81.7 million from voice mail which when divided by \$3.9 billion in basic service revenues, gives .021. Actual cost data would reveal much the same ratio.

³³See Taylor (1980).

³⁴In addition, the loss of cost complementarities would also raise the cost of enhanced services, producing an additional welfare loss in this market.

Figure B.2

Combined Welfare Effects from
Inflated Basic Service Rates and Cost Complementarities



$$WG = \frac{1}{2} \left(\frac{\Delta P}{P_b^r} \right)^2 e_d B + \left(\frac{\Delta C}{P_b^r} \right) B \quad (\text{B6})$$

where ΔC is the cost increase due to the loss of cost complementarities.

To illustrate the importance of including the offsetting welfare loss from cost complementarities, Table B.1 shows the welfare effects corresponding to different rates of cost shifting ($\phi = 0, .05, .10$)³⁵ and to different ranges of cost complementarities ($\delta = 0, .002, .004, .006$)³⁶

Simplicity assumes very modest cost complementarities associated with on-going operations and marketing costs. Both one-time disruption costs and R&D costs are omitted as well as the effects of higher costs on enhanced services. Even though the omission of all of these additional sources of welfare loss would further raise the welfare loss from structural separation, the effects in Figure B.2 are sufficient to overshadow any welfare gain.

Table B.1 uses equation (B6) to compute the net welfare gain (WG) for various parameter values of ϕ and δ . First, Table B.1 shows the obvious result that in a world of no cost shifting ($\phi = 0$) and no cost complementarities ($\delta = 0$) there would be no welfare effects. Second, assuming no cost complementarities ($\delta = 0$) and cost shifting of 5% and 10% ($\phi = 0.05, 0.10$), the monthly welfare gain per access line is 1.3×10^{-6} and 5.3×10^{-6} . The introduction of even slight cost complementarities ($\delta = .002$) implies that the welfare gain area in Figure B.2 dominates the triangular welfare gain area, resulting in welfare losses of $\$4.8 \times 10^{-2}$ per access line. Indeed the welfare gain triangle gets lost in the roundoff error since the welfare loss is roughly 9000 times greater than the welfare gain assuming maximum cost shifting $\phi = 0.10$. For larger degrees of cost complementarities

³⁵Note that ϕ relates to $\Delta P/P_b^r$ as follows: $\frac{\Delta P}{P_b^r} = \phi \frac{C_e}{C_b}$ where C_e and C_b are total costs of enhanced and basic services.

³⁶Note that δ , the parameter reflecting the total cost complementarities in both enhanced and basic services is expressed for convenience as the fraction of basic service cost reduction due to cost complementarities in joint production. It is related to ΔC in Figure X.2 as follows: $\delta = \frac{\Delta C_b}{P_b^r}$.

($\delta = 0.004, 0.006$), the welfare losses are even more pronounced reaching $\$1.44 \times 10^{-1}$, per monthly access line. Multiplied by the 13.6 million access lines in the US West region and converted to an annual welfare loss, the total is \$3.4 million dollars.

In offering these welfare calculations, we emphasize the qualitative nature of the results and offer some caveats. The exact quantitative magnitude can change as more refined estimates of costs are obtained. Furthermore, the estimate of the cost complementarity parameter, δ , is intended to give only rough estimates of potential cost complementarities. Such items are inherently difficult to quantify, and could well be much larger resulting in even greater welfare losses from cost complementarities. Not included in the estimates in Table B.1 are the welfare losses due to the loss of cost complementarities in the enhanced service market.

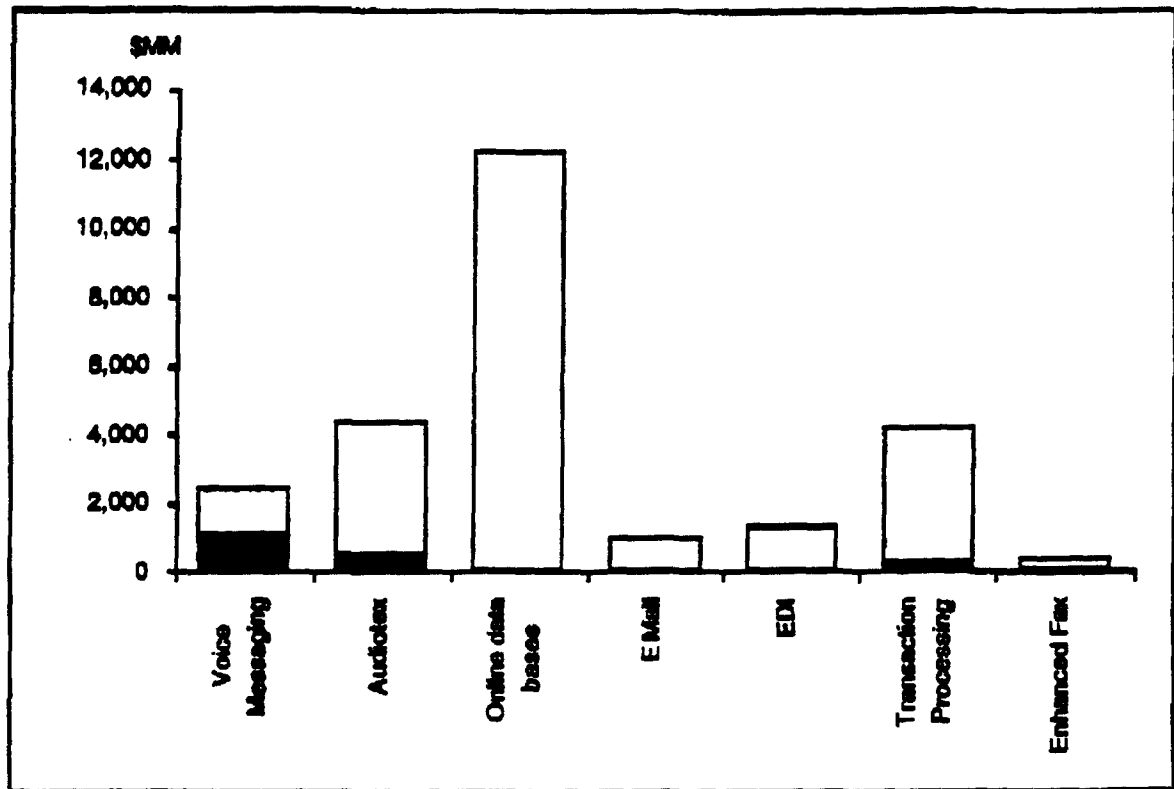
TABLE B.1

**Monthly Welfare Gain per Access Line under Alternative
Cost Shifting (ϕ) and Cost Complementarity (δ) Assumptions**

	$\phi = 0$	$\phi = 0.05$	$\phi = 0.10$
$\delta = 0$	0	1.3×10^{-6}	5.3×10^{-6}
$\delta = 0.002$	-4.8×10^{-2}	-4.8×10^{-2}	-4.8×10^{-2}
$\delta = 0.004$	-9.6×10^{-2}	-9.6×10^{-2}	-9.6×10^{-2}
$\delta = 0.006$	-1.44×10^{-1}	-1.44×10^{-1}	-1.44×10^{-1}

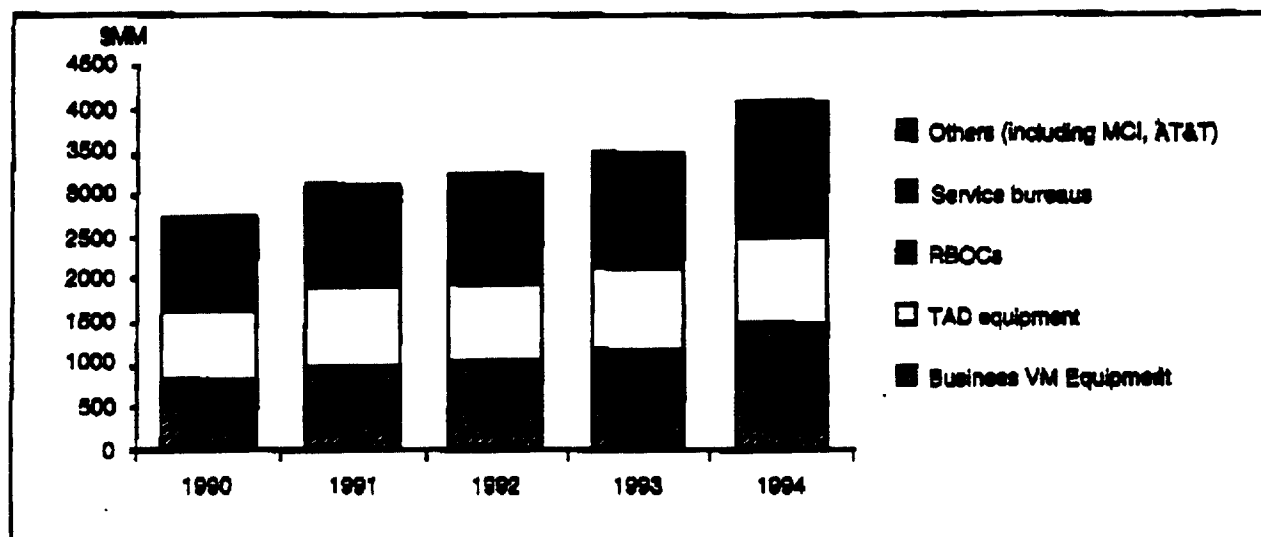
APPENDIX C

Exhibit C.1: RBOC SHARE OF ENHANCED SERVICE MARKETS



Source: Insight Research, Frost and Sullivan, Marketfinders

**Exhibit C.2: VOICE MESSAGING MARKET BY VENDOR TYPE
(EQUIPMENT AND SERVICES)**



Source: Frost and Sullivan, NATA, Yankee Group, BAH Analysis

ATTACHMENT C

**BENEFITS AND COSTS OF VERTICAL INTEGRATION OF BASIC
AND ENHANCED TELECOMMUNICATIONS SERVICES**

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BENEFITS AND COSTS OF VERTICAL INTEGRATION OF BASIC AND ENHANCED TELECOMMUNICATIONS SERVICES

I. Introduction

The FCC is in the process of reviewing its policies to determine the form in which the Bell Operating Companies (BOCs) may participate in the enhanced services market.¹ FCC regulation of enhanced services has previously addressed two potential problems, cross subsidization and access discrimination. The FCC has established two regulatory measures that significantly reduce the risk of cross subsidization. Price cap regulation, which breaks the link between direct costs and rate changes, does not allow the BOCs to raise prices above the rate caps approved by the FCC. The BOCs, therefore, do not have the incentive to set lower rates for regulated services used in the provision of enhanced services in the hope that they can increase prices for other regulated services. In addition, the FCC has implemented cost accounting rules, including detailed joint cost rules, cost allocation manuals, reporting requirements and accounting audits, that increase the ability to identify cross subsidization.

Access discrimination can arise when preferential network access is given to an BOC's affiliated enhanced services provider over a non-affiliated enhanced service provider. The FCC decided that network unbundling, in the form of discrete cost-based services and features, for services required to provide enhanced services would insure that BOCs could not discriminate against their competitors. The FCC's Open Network Architecture (ONA) framework and its unbundling policy were designed to accomplish network unbundling for features used by non-affiliated enhanced services providers to compete with the BOCs. In its recent remand decision, the Ninth Circuit required the FCC to explain and justify its decision to allow BOCs to offer all enhanced services on an integrated basis, given the current state of unbundling.² The FCC's investigation is, however, broader in scope than the minimum requirements set out by the Ninth

¹Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services, CC Docket No. 95-20, Notice of Proposed Rulemaking (released February 21, 1995).

²California v. FCC, 39 F.3d 919 (9th Cir. 1994) ("California III")

Circuit. An important factor in the FCC's reconsideration will be determining whether the economic benefits to be gained by permitting vertical integration of BOC basic and enhanced services exceed the possible costs imposed on consumers of not requiring structural separation.

This paper identifies and quantifies the potential benefits and costs of vertical integration of basic and enhanced telecommunications services. In particular, we find that joint production facilitates the offering of new products and services, which provide large benefits to consumers. Focusing on voice messaging -- to date the most prominent Regional Bell Operating Company enhanced service -- we calculate that the delay in making this service available has cost consumers well over \$1 billion annually. The cost to consumers of delay has exceed well over \$10 billion since 1981. In addition, the extra production costs that would be incurred by foregoing the economies of scope from joint production would amount to over \$100 million annually. In contrast, (1) the enhanced service markets in which the BOCs operate are robustly competitive, (2) the existing Open Network Architecture rules followed by the BOCs are designed to offer nondiscriminatory access at prices that avoid cross-subsidies, and (3) all available evidence shows that these rules are working as intended and that the enhanced service market is thriving. It is clear that any benefits to competition that may arise from structural separation are far outweighed by the loss of benefits and extra costs we have identified which arise from structural separation.

The remainder of this paper has five sections. We first describe the economic principles that should guide telecommunications competition. In Section III, we examine the state of competition in information and enhanced services markets. Next, in Section IV, we measure the benefits from offering new telecommunications services. Section V quantifies the costs of structural separation. The final section summarizes our findings.

II. Economic Principles for Economically Efficient Competition

Telecommunications markets are generally very dynamic, compared to most other markets. Products are proliferating, new firms are joining the fray, and existing firms are adjusting through alliances, mergers, and the like. The market for enhanced telecommunications services is no exception. For voice messaging, which accounts for the bulk of the BOCs' enhanced service revenues, Frost & Sullivan estimated that 1993 revenues from voice messaging services were \$1.4

billion and that the market is expected to grow at a rate of 12.7 percent annually through the year 2000.³ In addition, revenues from competing voice messaging CPE are an equivalent amount and are growing at double digit rates.⁴ In total, voice messaging revenues are approaching \$3 billion annually. Further, there are literally thousands of firms providing voice messaging services, and the BOCs are far from enjoying a dominant position. For dynamic markets like these, it is especially important that firms be able to compete on their own merits, absent regulatory rules that help or hinder particular firms. In this section, we discuss the economic principles for efficient competition in dynamic markets.

A. Telecommunications competition (including enhanced services markets) is characterized by firms competing on the basis of unique scope economies

Telecommunications has always been characterized by economies of joint production, or scope economies. With the convergence of industries -- telephony, information, etc. -- the importance of scope economies is even greater. For example, AT&T has recently acquired McCaw, which provides cellular services, including voice messaging; Sprint has formed a venture with major cable television firms, and was the high bidder at the recently concluded broadband PCS spectrum auction. Clearly, although the BOCs have long possessed economies of scope, other competing firms have their own unique economies. To provide the greatest benefits to consumers, it is essential that all firms be able to employ these economies. The results of this type of competition are lower prices for consumers and greater availability of new services in a timely fashion. Measures that unduly restrict the employment of scope economies, such as onerous structural separation requirements, will reduce the benefits from competition and harm consumers.

Economists are close to unanimous in believing that, whenever feasible, effective competition produces results superior to those of comprehensive economic regulation. The potential benefits of introducing competition into regulated markets generally are of two major

³Frost & Sullivan, U.S. Voice Messaging Service Markets, Report 5172-63 (Dec. 1994).

⁴NATA, 1993-94 Telecommunications Market Review and Forecast 171 (1994).

kinds: moving prices into closer correspondence with economic costs, and dynamic improvements in productive efficiency and in product or service offerings. Competition will concentrate on the services whose prices are held above marginal or incremental costs and tend to drive those prices down to the economically proper and efficient levels. Competition also tends -- unless it is distorted by regulation -- to improve the efficiency with which services are provided, by weeding high-cost firms out of the market and by exerting pressure on the survivors to improve the quality of their offerings and to be innovative in developing and offering new services and service combinations. Thus, telecommunications regulation should allow firms to employ their economies of scope so that services can be produced at minimum cost, and should allow these firms to be free to introduce innovative services which creates large gains in consumer welfare.

III. BOC Participation in the Enhanced Services Market Has Led to Lower Prices and Greater Output

BOC participation in the enhanced services market has been good for consumers. Consumer welfare increases when prices decrease. In the voice messaging services segment, which is the primary segment of current BOC participation, prices have decreased significantly since BOC entry. The range of the price decrease has been from about \$30 per month in 1990 to \$5-15 per month currently. An additional increase in consumer welfare arises when a new product is offered to a segment of consumers for the first time. BOC success in offering voice messaging to the "mass market" of residential and small business customers has been phenomenal. Over the past 5 years BOC subscriptions have increased from essentially zero to over 6 million subscriptions.⁵ Growth for the rest of the decade is forecast at around 12 percent per year. No anticompetitive effect has occurred in voice messaging or other segments of the enhanced services market. Thus, BOC participation has been pro-competitive and has increased consumer welfare.⁶

⁵"Voice Messaging," Telephony, Feb. 20, 1995, at 23.

⁶For BOC entry to have an anticompetitive effect, output would need to be lower than it would have been if the BOCs had been prohibited from participation. No party can seriously claim that output would have been higher without BOC participation. Effects on individual

The regulatory road for the BOCs to provide enhanced services has been long and tortuous. In 1981 AT&T applied to the FCC for permission to provide "Custom Calling II" services, which included voice messaging services, on an unseparated basis.⁷ However, the FCC rejected AT&T's request. Subsequent to the FCC's negative decision, the Modification of Final Judgment (MFJ) went into effect. The BOCs were prohibited from providing "information services" (which had a very similar definition to the FCC "enhanced service" definition) under Section II.D.1 of the MFJ. The combined effect of the FCC decision and the MFJ caused voice messaging not to be offered to residential and small business customers by the BOCs.

The following events then transpired which permitted the BOCs to offer enhanced (information) services:

1985: The FCC begins Computer III proceedings with an emphasis on allowing BOCs to provide enhanced services subject to non-structural safeguards.

1988: (i) Judge Greene authorizes BOCs to provide "gateway" information services (which includes voice messaging under the MFJ).

(ii) BOCs file ONA plans designed to ensure competitors have Comparably Efficient Interconnection (CEI).

(iii) FCC begins approving CEI plans to allow BOCs to provide individual enhanced services on a structurally integrated basis.

1990: (i) Ninth Circuit remands Computer III to FCC.

(ii) FCC authorizes BOCs to continue to provide enhanced services on an interim basis according to CEI plans.

competitors are subsumed into the overall measure of output when a consumer welfare calculation is done.

⁷AT&T had already designed and begun to install the services on an unseparated basis prior to the FCC's Computer II decision, which required structural separation.

- 1991: (i) Judge Greene removes information services restriction totally.
(ii) FCC issues remand order to allow structural integration of BOC enhanced services and approves final BOC ONA plans.
- 1992: BOCs begin offering integrated enhanced services under ONA plans.
- 1994: Ninth Circuit again remands Computer III to FCC.
- 1995: FCC authorizes BOCs to continue to provide enhanced services under the CEI plan regime.

From an economist's viewpoint, this regulatory imbroglio has created significant social costs. As we will discuss in the next section, consumer welfare would have been significantly higher if BOC voice messaging services had been offered sooner. Furthermore, government, management, and lawyers' time has been spent debating the issue of structural separation for nearly 20 years. A rational cost-benefit analysis demonstrates that the benefit to consumers of having BOC enhanced services available far exceeds any possible cost that hypothetically might arise. Indeed, we quantify these potential benefits and costs in the next sections of this paper.

As the above regulatory history demonstrates, the key dates were 1988 and 1991, when the MFJ restrictions were removed and the FCC decided to allow BOCs to offer enhanced services on a structurally integrated basis. Beginning in 1988, pending approval of final ONA plans, BOCs were permitted to offer specific enhanced services on a structurally integrated basis, subject to FCC approval of CEI plans for those services. The FCC ultimately approved blanket authorization for BOCs to offer enhanced services without a structural separation requirement in 1991. Thus, we consider data from 1988, 1991, and the most current data available to analyze the evolution of the enhanced services market.

Overall, information services are a large part of the U.S. economy, with estimated revenues of \$135.9 billion. According to the Commerce Department, information services is

"among the fastest growing sectors of the economy."⁸ Some of the largest and most sophisticated companies in the U.S. participate in this sector, including GE, AT&T, MCI, IBM, Sears, Microsoft, TCI, Time Warner, and American Airlines.

The individual segments of the information service industry, all of which use telephone lines as well as other distribution media in varying ways, are also thriving. Enhanced (information) services have grown 15 percent a year since 1991 to reach an estimated \$15 billion in 1994. Some 65 percent of these services are delivered on-line, with the remainder delivered on CD-ROM or using wireless or other distribution technologies. Data processing and network services are another segment which has grown by over 14 percent a year since 1991 to over \$50 billion by 1994. This segment includes services such as credit card authorizations, data entry, payroll processing, electronic mail, and electronic data interchange. Lastly, computer professional services have grown by about 9 percent a year to reach \$65 billion in 1994. This segment includes systems integration and consulting services. Thus, no anticompetitive effect of BOC entry into information services has occurred. Overall, the market continues to be very competitive.

The market segment for enhanced (information) services is particularly relevant here since this segment includes many of the business which the BOCs have entered. This segment, including on-line databases, value added network services, voice messaging, and electronic mail, grew from \$7.5 billion in 1988 to \$10.2 billion in 1991 and to \$13.6 billion in 1993, which is the last available data.⁹ Market growth in 1993 was 16 percent, which was higher than the year before. The market is expected to maintain that rate of growth for the next few years.¹⁰

Value added network (VAN) services have grown from \$0.5 billion in 1989 to \$3.4 billion in 1993. Subscribership to all videotex gateways increased from 715,000 in 1988 to 6.3 million

⁸U.S. Dep't. of Commerce, 1994 U.S. Industrial Outlook 25-21 (1994).

⁹U.S. Industrial Outlook: 1990 at 29-2, 1992 at 26-1, 1994 at 25-2. The Commerce Department discontinued this publication in 1995.

¹⁰1994 U.S. Industrial Outlook 25-2 and 29-7.

in 1994.¹¹ Electronic mail has become widely available since 1988. E-mail subscribership has grown from 6 million in 1989 to over 13 million in 1993.¹² E-mail revenues increased from \$574 million in 1989 to \$740 million in 1991 and an estimated \$1.2 billion in 1994. BOCs have not attained anything remotely close to a dominant position in any of these enhanced market segments.

Similarly, BOC entry into the voice messaging market segment has led to lower prices and higher demand. Between 1989 and 1991, users of voice messaging CPE more than doubled, from 5.3 million to 11.6 million, and now accounts for \$1.3 billion annually.¹³ The overall voice messaging market segment grew from \$665 million in 1989 to \$1.1 billion in 1991 and \$1.54 billion 1994. Forecasts of future growth have the market doubling to over \$3 billion by 2000.¹⁴ Forecasted annual growth over this period is 12 percent. Thus, output has expanded rapidly in the voice messaging market segment which demonstrates the pro-competitive effects of changes in FCC and MFJ regulation.

Since 1991, prices have decreased by 50 percent for most voice messaging equipment. Equipment improvements such as voice messaging boards for PCs have become widely available at relatively low cost. Thus, voice messaging equipment continues to place a significant price constraint on network-based voice messaging services.

Prices for voice messaging services have decreased greatly since BOC entry into the market segment. Frost and Sullivan states that in 1990 the average monthly fee for voice messaging was just under \$30. By 1993 the average monthly fee decreased by about 50%, or a decrease in price of over 20 percent per year. Frost and Sullivan attributes this "dramatic drop" in prices to the growth of a more competitive market, driven by the lower-priced voice messaging offered by the BOCs and the independent LECs. By 2000, Frost and Sullivan predicts a further

¹¹Boston Globe, Jan. 14, 1995, at 61.

¹²1990 U.S. Industrial Outlook 31-4; 1994 U.S. Industrial Outlook 29-7.

¹³NATA, 1991 Telecommunications Market Review and Forecast 135 (1991); NATA, 1993-94 Telecommunications Market Review and Forecast 171.

¹⁴NATA, 1993-94 Telecommunications Market Review and Forecast 171; Frost & Sullivan, U.S. Voice Messaging Services Markets, Report 5172-63 (Dec. 1994).

decrease in the average fee for voice messaging by about another 50 percent (pp. 3-10 to 3-11).

Regarding current market conditions, Frost and Sullivan reports that:

"Today, there are numerous providers of voice messaging services in a highly competitive market. The entrance of the BOCs and independent LECs in the late 1980s create fierce competition for the local/regional service bureaus....The RHCs and independent LECs have developed the residential end-user market, which previously had little interest in or knowledge of voice messaging." (p. 1-4)

Lower prices, increased competition, and development of a new market segment have been the result of BOC entry into the voice messaging segment of the enhanced services market. All of these outcomes lead to increased consumer welfare. This pro-competitive outcome stands in stark contrast to FCC and MFJ regulatory policy in the early and mid-1980s which led to an absence of BOC participation in enhanced service markets. Consumer welfare was lower and the economic efficiency of the U.S. economy was lowered by these misguided regulatory policies. Thus, as we discuss below, the FCC policy of structural integration and removal of the MFJ restrictions on information services provision by BOCs has led to a significant increase in consumer welfare which easily exceeds over \$1 billion per year.

We finally observe that the voice messaging market is very unconcentrated. The BOCs and GTE combined account for about one-sixth of voice messaging revenues combined. However, individual LEC market shares are much lower. BOC market shares for voice messaging services range from around 6 percent for Bell Atlantic, BellSouth, and Pacific Telesis, to about 1 percent for NYNEX. Competition continues to be very strong for voice messaging customers, with both service prices and equipment prices decreasing at a rapid rate.

IV. Consumer Welfare from New Telecommunications Services

A. The Economic Importance of New Telecommunications Services

Regulatory restrictions which are designed to facilitate competition may often have a potentially much larger negative effect on consumer welfare which cannot be ignored: restrictions

on the introduction of new goods and services.¹⁵ Consider the introduction of a new telecommunications service which is not presently available — call it home distance learning over personal computers. The demand for such a service will exist, as will a demand curve, which is a schedule of quantities which would be bought at each monthly service price. See Figure 1. At lower prices more service is demanded, but even at quite high prices some demand remains from people who value the service quite highly. If the service were offered at price p_1 in Figure 1, all those individuals who would have paid more than p_1 receive the difference between what they would have paid and what they actually pay in increased consumer welfare. This added value is called the consumer's surplus and is the area labelled A in Figure 1. Consumer's surplus is a dollar measure of increased consumer welfare, and is almost universally accepted by economists and policy makers in valuing the effects of economic policy.

Now suppose because of regulation that home distance learning is not offered. For instance, if structural separation is required, the cost of the BOCs providing home distance learning might well be sufficiently high that, at prices which would be charged, insufficient consumer demand would exist to make the economic return on the investment high enough to justify the investment.¹⁶ The home distance learning application would then not be offered. No matter how much an individual is willing to pay, he cannot buy the home distance learning service. Indeed, the price might as well be infinity because no one can buy the service. If regulation is changed and the service is introduced, the price decreases from infinity to p_1 . To measure the gain in economic welfare, we use the change in price from the "virtual or reservation price" which causes zero demand, price p_2 in Figure 1, to the price that will be charged, which

¹⁵The welfare effect of delayed introduction of new goods or services has not been considered in most analyses of the economic effects of regulation. See, e.g., P. Joskow and N. Rose, "The Effects of Economic Regulation," in R. Schmalensee and R. Willig, Handbook of Industrial Organization, vol. II (1989) for a review of the effects of regulation.

¹⁶While the demand curve in Figure 1 demonstrates that some consumer demand would exist unless prices became quite high, at high prices caused by high costs demand may not be enough to cover the fixed costs of providing the service. Fixed costs of providing enhanced services are almost always a large component of the overall costs of providing the service.

is p_1 in Figure 1.¹⁷ The large change in price will lead to a large increase in economic welfare so long as significant demand exists for the new product or service.

The economic theory of the valuation of new goods was developed by the Nobel Prize winning British economist Sir John Hicks in 1940. In recent papers, Hausman further developed the theory and has applied it to measuring the consumer welfare cost of the delay in the introduction of cellular telephone.¹⁸ We will first apply the theory to the case of voice messaging, which had a delayed introduction of approximately 5-7 years, to demonstrate the large potential losses in consumer welfare from regulatory-caused delays or even permanent postponement in the introduction of new telecommunications services.

B. Consumer Welfare Losses from the Delay in Voice Messaging

Voice messaging using central office-based telephone technology was sufficiently developed to begin operation in the early 1980's in the U.S.¹⁹ As noted, AT&T applied for permission with the FCC in 1981 to provide "Custom Calling II" services, which included voice messaging services, on an unseparated basis. However, the FCC rejected AT&T's request, mainly because of fears of cross subsidy.²⁰ AT&T had claimed that it would need to redesign its network equipment to provide messaging on a structurally separated basis, but the FCC rejected the claim. AT&T stated that a redesigned system for structural separation would take three years to introduce, and the additional cost would be substantial. The FCC decided that, since it was "technically possible" to provide structurally separated voice messaging, AT&T would not be

¹⁷For an application of the theory of the valuation of new goods and extension of the theory in a non-regulated context, see J. Hausman, "Valuation of New Goods Under Perfect and Imperfect Competition," MIT Working Paper (June 1994a).

¹⁸The papers are J.R. Hicks, "The Valuation of the Social Income," Economic Journal (1940); Hausman, 1994a, op. cit.

¹⁹See R.F. Rey, ed., Engineering and Operations in the Bell System (1983) for an early description of the development of AT&T's custom calling services.

²⁰AT&T Petition for Waiver of Section 64.702 of the Commission's Rules and Regulations ¶18, 88 F.C.C. 2d 1 (1981). The FCC recognized the presence of economies of scope in voice messaging (¶17) but feared a "slippery slope" that would create regulatory uncertainty.

allowed to provide it on an integrated basis (§53). Extra economic costs due to structural separation had only a minor role in the FCC decision. Subsequent to the FCC's negative decision, the Modification of Final Judgment (MFJ) went into effect. The BOCs were prohibited from providing "information services" (which had a very similar definition to the FCC "enhanced service" definition) under Section II.D.1 of the MFJ. The combined effect of the FCC decision and the MFJ caused voice messaging not to be offered to residential and small customers by the BOCs.²¹ Competing service providers did not offer voice messaging services, despite their previous claims that the equipment already existed which would permit them to offer the services, and despite the FCC's belief that competing service providers would offer the services (§85, §103). Thus, residential and small business customers did not have the opportunity to purchase voice messaging services.

In March 1988 Judge Greene authorized the BOCs to provide transmission (but not content) based information services. Also in 1988 the FCC began approving comparably efficient interconnection (CEI) plans which allowed the BOCs to provide individual enhanced services, such as voice messaging, on a structurally integrated basis. These changes in regulation permitted the BOCs to begin to offer the voice messaging services they had originally petitioned the FCC to provide in 1981. In practice, the BOCs began to offer voice messaging services in 1990. Demand growth for voice messaging has been extremely rapid, with current BOC subscriptions at about 6 million customers. Clearly, the demand for voice messaging existed in the U.S. in the 1980's. The technology also existed to permit voice messaging to be offered on an economical basis. However, the combination of FCC regulation and the information services prohibition of the MFJ delayed the introduction of voice messaging services in the U.S. for somewhere between 5-7 years. We now calculate the effect on consumer welfare of the delay in voice messaging services in the U.S.

²¹AT&T had told the FCC that it would not be economic to provide voice messaging services on a structurally separated basis, but the FCC rejected the claim. Medium and large businesses were able to use voice messaging services through their internal PBXs. These PBXs often had extremely similar designs to the Central Office Switches (COS) used by the BOCs, e.g. the Northern Telecom switches. However, the BOCs were prohibited from using their COSs to offer voice messaging services to their customers due to FCC rules and the MFJ.